Amendment to the Claims:

This listing of claims 49-88 will replace all prior versions, and listing of claims in the application.

Listing of Claims

1. – 48. (Cancelled)

49. (New) An interferometric apparatus for performing optical spectroscopy with high spectral resolution in a compact arrangement, the apparatus comprising:

(a) means for coupling in a single spatial mode of an incoming light field to be examined;

(b) means for splitting said single spatial mode of said incoming light field into at least two subfields;

(c) means for changing one of a shape or a direction of propagation of the wavefront of at least one of said at least two subfields in dependence on the wavelength;

(d) means for generating an interference pattern by superimposing said at least two subfields;

(e) detection and analysis means to record and evaluate said interference pattern at a plurality of discrete spatial positions in order to derive spectral properties of said incoming light field.

50. (New) An interferometric apparatus in accordance with claim **49**, wherein said detection and analysis means to record and evaluate said interference pattern comprises detection means for recording an intensity of said modified interference pattern at a plurality of discrete spatial positions; and numerical analysis means for reconstructing an optical spectrum or spectral properties of said incoming light field by performing calculations on said recorded intensities.

51. (New) An interferometric apparatus in accordance with claim **49**, wherein said detection and analysis means to record and evaluate said interference pattern comprises detection means for recording a weighted sum of the intensities of said interference pattern at a plurality of discrete spatial positions in order to identify an optical spectrum or spectral properties of said incoming light field according to a predetermined set of said weights.

52. (New) An interferometric apparatus in accordance with claim **51**, wherein said detection means for recording a weighted sum of the intensities includes a spatial mask which correlates with at least one generated interference pattern to be detected.

53. (New) An interferometric apparatus in accordance with claim **52**, wherein said spatial mask is one of a fixed form and a changeable form.

54. (New) An interferometric apparatus in accordance with claim **52**, wherein said detection means is combined with said spatial mask for detecting a spatial modulation.

55. (New) An interferometric apparatus in accordance with claim **49**, wherein said means for splitting said single spatial mode of said incoming light field into said at least two subfields further comprises means for dividing the amplitude of said single spatial mode of said incoming light field into at least two subfields.

56. (New) An interferometric apparatus in accordance with claim **49**, wherein said means for splitting said single spatial mode of said incoming light field to at least two subfields further comprises means for dividing the wavefront of said single spatial mode of said incoming light field into said at least two subfields.

57. (New) An interferometric apparatus according to claim **49**, wherein said means for coupling in said single spatial mode of an incoming light field to be examined, comprises a spatial filter configured to permit a single spatial mode.

58. (New) An interferometric apparatus according to claim **49**, wherein said means for coupling in said single spatial mode of an incoming light field to be examined, further comprises an optical mono mode fiber.

59. (New) An interferometric apparatus according to claim **49**, wherein said means for changing the shape or the direction of propagation of the wavefront of at least one of said two subfields in dependence on the wavelength comprises a spectrally dispersive optical element

60. (New) An interferometric apparatus according to claim **49**, wherein said means for changing the shape or the direction of propagation of the wavefront of at least one of said two subfields in dependence on the wavelength comprises a diffractive optical element.

61. (New) An interferometric apparatus in accordance with claim **60**, wherein said diffractive optical element has non-periodic diffraction structures.

62. (New) An interferometric apparatus in accordance with claim **60**,wherein said diffractive element is selected from the group comprising: a multiplex grating, a multiplex hologram, a holographic optical element, and a computer-generated hologram.

63. (New) An interferometric apparatus in accordance with claim **49**, wherein said means for splitting said single spatial mode of an incoming light field into said at least two subfields and said means for changing the shape or the direction of propagation of the wavefront of at least one of said two subfields in dependence on the wavelength share at least one common optical element.

64. (New) An interferometric apparatus in accordance with claim **49**, wherein the detection means is configured to move through the interference pattern with respect to a single spatial degree of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions.

65. (New) An interferometric apparatus in accordance with claim **49**, wherein the detection means is moved through the interference pattern with respect to two spatial degrees of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions.

66. (New) An interferometric apparatus in accordance with claim **49**, wherein the interference pattern is directed onto the detection means via optical elements moveable with respect to one spatial degree of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions of said interference pattern.

67. (New) An interferometric apparatus in accordance with claim **49**, wherein the interference pattern is directed onto the detection means via optical elements moveable with respect to two spatial degrees of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions of said interference pattern

68. (New) An interferometric apparatus in accordance with claim **49**, wherein the detection means is one of a spatially one-dimensional resolving detector or a one-dimensional detector array for recording said intensities of said modified interference pattern at said plurality of discrete spatial positions

69. (New) An interferometric apparatus in accordance with claim **49**, wherein the detection means is one of a spatially two-dimensional resolving detector or a two-dimensional detector array for recording said intensities of said modified interference pattern at said plurality of discrete spatial positions

70. (New) An interferometric apparatus in accordance with claim **49**, further comprising means to change the optical path length for at least one of said subfields before being superimposed to generate said interference pattern.

71. (New) An interferometric apparatus in accordance with claim **49**, further comprising means to influence the optical path length for at least one of said subfields before being superimposed to generate said interference pattern. in dependence on the wavelength.

72. (New) An interferometric apparatus in accordance with claim **49**, further comprising means to shift or modulate the relative phase of at least one of said at least two subfields with respect to at least one other of said at least two subfields being superimposed to generate said interference pattern.

73. (New) An interferometric apparatus in accordance with claim **49**, further comprising means to change or modulate a spatial position of at least one of said two subfields with respect to at least one other of said at least two subfields.

74. (New) An interferometric apparatus in accordance with claim **49**, further comprising means to change or modulate the spatial position of said single spatial mode of said incoming light field.

75. (New) An interferometric apparatus in accordance with claim **49** further **comprising means** to form an optical resonator.

76. (Currently Amended) An interferometric apparatus in accordance with claim **75**, wherein one or more of said means for changing one of a shape or a direction of propagation of the wavefront of at least one of said at least two subfields in dependence on the wavelength are arranged at the interior of said resonator.

77. (New) An interferometric apparatus in accordance with claim **49**, wherein said means for generating an interference pattern by superimposing said at least two subfields comprises one of a retroreflector or a dieder.

78. (New) An interferometric apparatus in accordance with claim **49**, wherein said means for generating an interference pattern by superimposing said at least two subfields further comprises means for rotating at least one optical component to adjust spatial frequencies of said generated interference pattern.

79. (New) An interferometric apparatus in accordance with claim **78**, wherein said means for rotating at least one optical component causes one of a simultaneous shift or modulation of the relative phase of at least one of said at least two subfields with respect to at least one other of said at least two subfields being superimposed to generate said interference pattern.

80. (New) An interferometric apparatus in accordance with claim **49**, wherein said apparatus further comprises one of a spectrally selective filter and a spectrally selective detector.

81. (New) A method for determining one of an optical spectrum of a light field to be examined and spectral properties of the light field to be examined using an interferometric apparatus, the method comprising:

(a) coupling in a single spatial mode of said light field to be examined

(b) splitting said single spatial mode into at least two subfields

(c) generating an interference pattern by superimposing said at least two subfields

(d) changing one of a shape or a direction of propogation of the wavefront of at least one of said at least two subfields in dependence on the wavelength, thereby causing each different spectral component with a discriminative wavelengths of said single spatial mode of an incoming light field to generate a different of said interference pattern;

(e) measuring the intensity of said generated interference pattern at a plurality of discrete spatial positions;

(f) generating a numerical representation of said interference pattern using the values of said measurements of the intensity of said interference pattern;

(g) calculating one of said optical spectrum or said spectral properties by numerical analysis of said numerical representation of said interference pattern by correlating said numerical representation of said interference with certain base patterns; wherein said base patterns correspond to numerical representations of said interference patterns for corresponding basic spectral features.

82. (New) A method in accordance with claim **81**, wherein said calculating step for performing a numerical analysis of said numerical representation of said interference patterns comprises performing one of: a Fourier transformation of said numerical representation, a Hartley transformation of said numerical representation, or a mathematical transformation to represent said interference pattern as a linear combination of sinus or cosinus functions.

83. (New) A method in accordance with claim **81**, wherein said calculating step for performing a numerical analysis of said numerical representation of said interference pattern comprises decomposition of said numerical representation of said interference pattern according to a set of base patterns dependent on said interferometric apparatus.

84. (New) A method in accordance with claim **83**, wherein said base patterns required for said decomposition are gained based on a measurement.

85. (New) A method in accordance with claim **84**, wherein the determination of said base patterns includes further includes the step of measuring the intensity of different interference patterns according to different relative phase positions of said subfields.

86. (New) A method in accordance with claim **81**, wherein said step of measuring the intensity of an interference pattern at a plurality of discrete spatial positions and said step of generating a numerical representation of said interference pattern using the values of said measurements of the intensity of said interference pattern further includes the step of measuring the intensity of different interference patterns according to different relative phase positions of said subfields..

87. (New) A method in accordance with claim **83**, such that respective numerical transformations or functions of said numerical representation of interference patterns and said base patterns are used instead of said numerical representation of interference pattern and said base patterns.

88. (New) A method in accordance with claim **81,** further comprising:

determining the difference of the optical path lengths of the subfields brought to interference for each of the said individual measurement points at a plurality of discrete spatial positions of said interference patterns

and

sorting the individual measured values in accordance to the difference of the optical path lengths of the partial fields brought to interference respectively determined from the measurement point.